

WHAT IS CLAIMED IS:

1. An image display apparatus which comprises an image display portion comprised of a pair of substrates disposed opposite to each other and having a peripheral edge sealed in order to form a sealed gap and an insulating liquid and a plurality of coloring charged particles disposed in the sealed gap, and which controls positions of the coloring charged particles so as to display an image, said apparatus comprising:

an electrode sheet disposed to be movable in the gap between the pair of substrates;

a writing unit arranged opposite to an electrode surface of the electrode sheet and outside the image display portion; and

a unit for moving the electrode sheet and the writing unit in parallel to the substrates and in a direction of a right angle to the arrangement.

2. The image display apparatus according to claim 1 wherein said writing unit has a photosensitive member, an electrode disposed so that said photosensitive member is sandwiched between said electrode sheet and the electrode, and a light source which irradiates said photosensitive member with light.

3. The image display apparatus according to claim 1 wherein said writing unit has electrodes arranged in

one row.

4. The image display apparatus according to claim
1 wherein said image display portion has flexibility, a
5 pair of first pressing members is disposed so as to
hold the image display portion, and the first pressing
members are moved along said substrate while pressing
said image display portion as the writing unit moves,
and successively push the insulating liquid and the
10 coloring charged particles out of said sealed gap.

5. The image display apparatus according to claim
4 wherein a voltage having the same polarity as a
polarity of said coloring charged particle is applied
15 to said first pressing member.

6. The image display apparatus according to claim
4 wherein at least one of said pair of first pressing
members is a roller.

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7. The image display apparatus according to claim
4, further comprising a liquid pressure adjustment
chamber which is connected to said sealed gap, and
which contains a surplus insulating liquid generated by
25 operation of said first pressing member.

8. The image display apparatus according to claim

1 wherein said electrode sheet has one edge attached to
a first wind-up shaft, and is moved when the wind-up
shaft is rotated.

5 9. The image display apparatus according to claim
1 wherein said electrode sheet has one edge attached to
a first wind-up shaft and the other edge attached to a
second wind-up shaft, and is moved when these wind-up
shafts are rotated.

10 10. The image display apparatus according to
claim 9 wherein said electrode sheet is attached to
said first or second wind-up shaft via a connection
member.

15 11. The image display apparatus according to
claim 1 wherein said image display portion has
flexibility, and is contained while one end of the
image display portion is wound.

20 12. The image display apparatus according to
claim 1 comprising three image display portions and
three writing unit, wherein the respective image
display portions display different color images, and
25 the image display portions are superposed upon one
another so that color display is performed.

13. The image display apparatus according to claim 1, further comprising color filters of different colors, wherein the color filters are selectively coated with said coloring charged particles so that
5 color display is performed.

14. The image display apparatus according to claim 1 wherein said image display portion is separated from said writing unit and is constituted to be
10 portable.

15. An image display apparatus which comprises an image display portion comprised of a pair of substrates disposed opposite to each other and having a peripheral edge sealed in order to form a sealed gap and an
15 insulating liquid and a plurality of coloring charged particles disposed in the sealed gap, and which controls positions of the coloring charged particles so as to display an image, said apparatus comprising:

20 a movable sheet member which is disposed to be movable in the gap between the pair of substrates, and which comprises means for stirring the insulating liquid of the image display portion by movement and simultaneously stripping the charged particles from the
25 substrates; and

a writing unit which is arranged outside the image display portion, and which moves in parallel to the

substrate and in a direction of a right angle to the arrangement while applying, an electric field to the charged particles of the image display portion so as to write the image.

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16. The image display apparatus according to claim 15 wherein the means for stirring said insulating liquid and simultaneously stripping the charged particles from the substrates includes a slide contact member facing the substrates.

17. The image display apparatus according to claim 15 wherein the means for stirring said insulating liquid and simultaneously stripping the charged particles from the substrates includes a through hole through which the insulating liquid and the charged particles can pass.

18. The image display apparatus according to claim 15 wherein said coloring charged particle is a magnetic toner, a magnet is disposed opposite to said image display portion, and the magnet is moved along said image display portion to perform cleaning of said coloring charged particles.

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19. An image display apparatus which comprises an image display portion comprised of a pair of substrates

disposed opposite to each other and having a peripheral edge sealed in order to form a sealed gap and an insulating liquid and a plurality of coloring charged particles disposed in the sealed gap, and which

5 controls positions of the coloring charged particles so as to display an image, said apparatus comprising:

an electrode sheet which is disposed to be movable in the gap between the pair of substrates, which comprises means for stirring the insulating liquid of
10 the image display portion by movement and simultaneously stripping the charged particles from the substrates, and which applies a cleaning voltage during or after the movement and thereby performs cleaning of said coloring charged particles; and

15 a writing unit which is arranged opposite to an electrode surface of the electrode sheet and outside the image display portion, and which moves in parallel to the substrate and in a direction of a right angle to the arrangement while applying, an electric field to
20 the charged particles of the image display portion so as to write the image.

20. The image display apparatus according to claim 19 wherein said image display portion has
25 flexibility, a second pressing member is disposed so as to hold said image display portion together with said writing unit, and the second pressing member is pressed

onto said image display portion while said writing unit writes the image.

21. The image display apparatus according to
5 claim 20 wherein said electrode sheet is stopped, while said writing unit writes the image.

22. The image display apparatus according to
10 claim 20 wherein said second pressing member is a rotatably supported roller.